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April 5, 1994

Mr. William Caton
Secretary
Federal Communications Commission
1919 M Street, N.W.
Washington, D.C. 20554

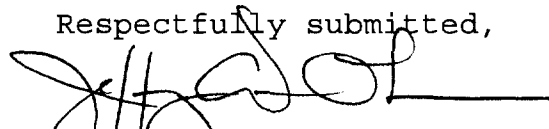
PR Docket No. 92-235

Dear Mr. Caton:

On April 5, 1994, an official of Nippon Telegraph and Telephone Corporation ("NTT") met with Ralph Haller, Chief of the Private Radio Bureau ("PRB"), and members of the PRB staff to discuss the above-captioned proceeding. The NTT official was accompanied by Robert Bednarek of Rubin, Bednarek and Associates and by attorneys from Paul, Weiss, Rifkind, Wharton & Garrison, including the undersigned.

The discussion involved the points raised in the comments and reply comments that NTT has filed with the Commission in the above-captioned docket, as well as the activities of the relevant standards-setting bodies regarding narrowband technologies. Information regarding various technical issues addressed during the meeting is enclosed for inclusion in the record.

Respectfully submitted,


Jeffrey H. Olson

Attachment

cc: Mr. Ralph Haller, Chief, Private Radio Bureau
Mr. Joseph Levin, Chief, Policy and Planning Branch
Dr. Doron Fertig, Policy and Planning Branch

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PRESENTATION OF
NIPPON TELEGRAPH & TELEPHONE CORPORATION
TO THE
FEDERAL COMMUNICATIONS COMMISSION
PRIVATE RADIO BUREAU
PR DOCKET NO. 92-235

APRIL 5, 1994

WHAT IS RZ SSB TECHNOLOGY?

RZ SSB TECHNOLOGY IS A COMBINATION OF TWO EXISTING TECHNOLOGIES:

- SSB SIGNAL FORMAT
- PM RECEPTION

SSB SIGNAL FORMAT MAINTAINS NARROWBAND FEATURES, WHILE PM RECEPTION BRINGS HIGH IMMUNITY TO FADING

FEATURES OF RZ SSB TECHNOLOGY

1. CHANNEL SPACING	5 kHz
2. INFORMATION SIGNAL BAND-WIDTH	300 Hz ~ 3.4 kHz
3. VARIOUS TRANSMITTABLE SIGNALS	<div> <div>VOICE/ENCRYPTED VOICE</div> <div>G3 FACSIMILE</div> <div>VOICE-BAND MODEM</div> </div>
4. MAXIMUM SPEED HANDLING CAPABILITY OF G3 FACSIMILE	9.6 kbps
5. MAXIMUM DATA HANDLING CAPABILITY (TESTED)	19.2 kbps
6. MAXIMUM SPECTRUM EFFICIENCY (DIGITAL)	3.84 bits/Hz (=19.2 kbps/5.0 kHz)
7. VERSATILE CHANNEL USAGE	FDMA(SCPC)/TDD/TDMA
8. ANALOG VOICE QUALITY	SUPERIOR TO 12.5 kHz FM
9. DIGITAL VOICE QUALITY	5.6 ~ 8.0 kbps/CODEC
10. DEGRADATIONS DUE TO MISTUNED CARRIER	NONE
11. IMMUNITY TO FADING AND INTERFERENCE	STRONG
12. COST COMPARED TO EXISTING EQUIPMENT	SAME

VERSATILE CHANNEL USAGE

5 kHz CHANNEL SPACING FDMA/SCPC *	5 kHz CHANNEL SPACING TDD	10 kHz CHANNEL SPACING 3CH-TDMA
<p>1. TELEPHONY VOICE</p> <p>2. ENCRYPTED VOICE BIT RATE = 9.6 kbps = 8 kbps/CODEC + 1.6 kbps/SC **</p> <p>3. G3 FACSIMILE 2.4 ~ 9.6 kbps</p> <p>4. VOICE-BAND MODEM 0.3 ~ 19.2 kbps</p>	<p>1. BIT RATE = 14.4 kbps***</p> <p>2. (5.6 kbps/CODEC + 1.6 kbps/SC) x 2</p>	<p>1. USB + LSB</p> <p>2. BIT RATE = 24.0 kbps = 12.0 kbps + 12.0 kbps</p> <p>3. (5.6 kbps/CODEC + 2.4 kbps/SC) x 3</p>

* SCPC : SINGLE CARRIER PER CHANNEL,

** SC : SUPERVISORY AND CONTROL,

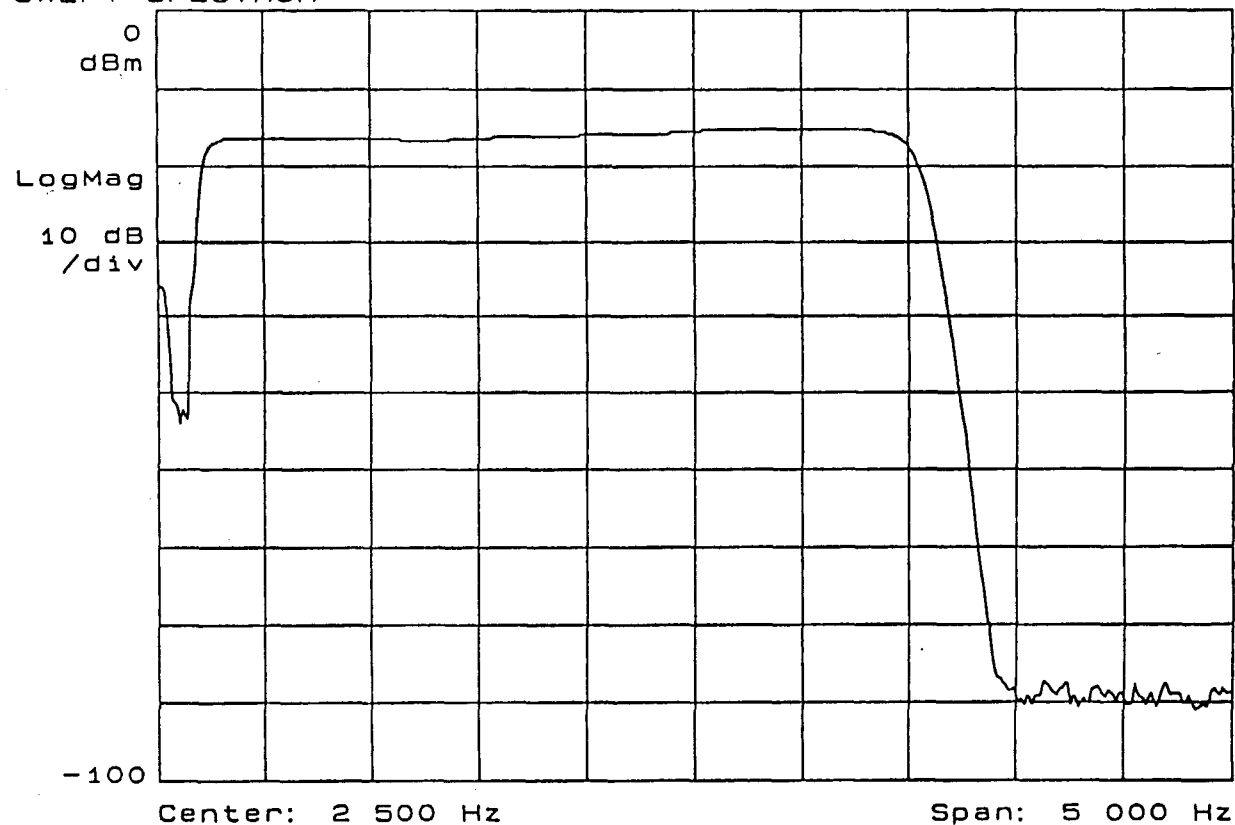
*** CCITT V.33

BASIC CONFIGURATION OF TRANSMITTER

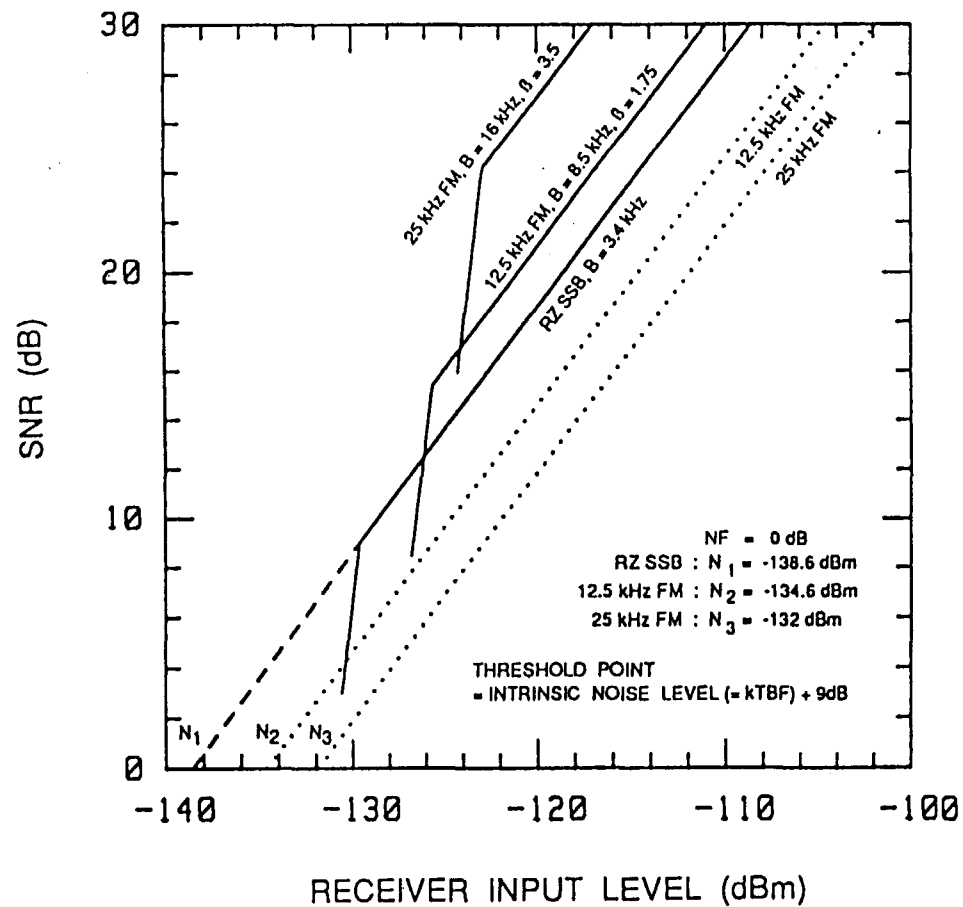
- (1) CONFIGURATION IS SIMILAR TO CONVENTIONAL SSB
- (2) SPECIAL SIGNAL TREATMENTS ARE NOT REQUIRED TO GENERATE SSB SIGNALS SINCE SSB WITH DIMINISHED CARRIER IS INTRODUCED
- (3) DIMINISHED CARRIER PLAYS IMPORTANT ROLE IN PM RECEPTION PROCESS

END TO END AF RESPONSE OF RZ SSB TRANSCEIVER

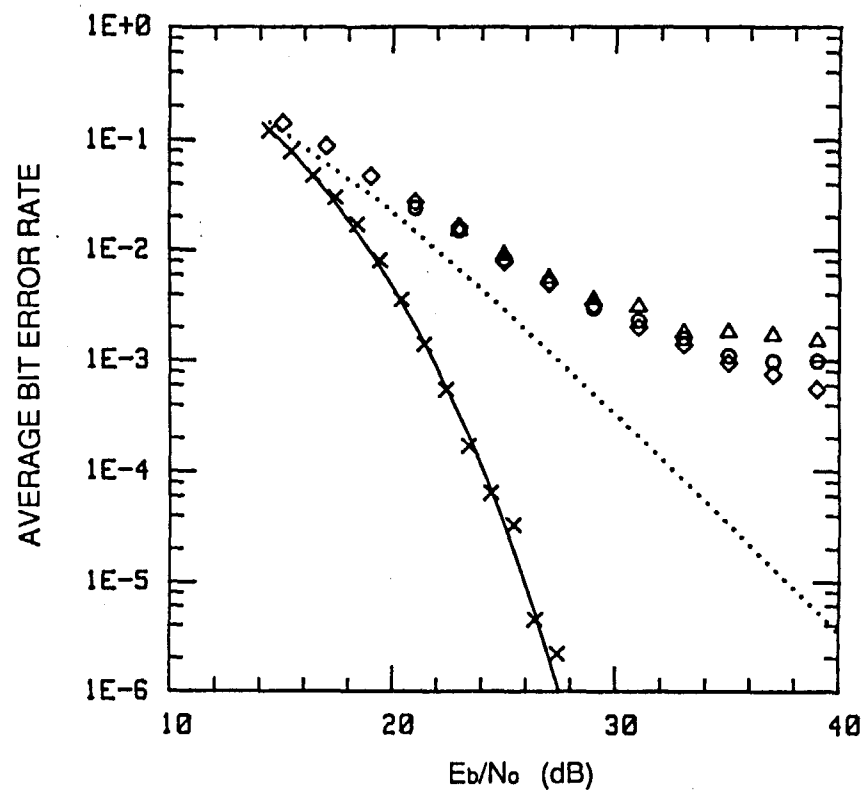
B: SWEPT SPECTRUM



SNR VS. RECEIVER INPUT LEVEL FOR FM AND SSB

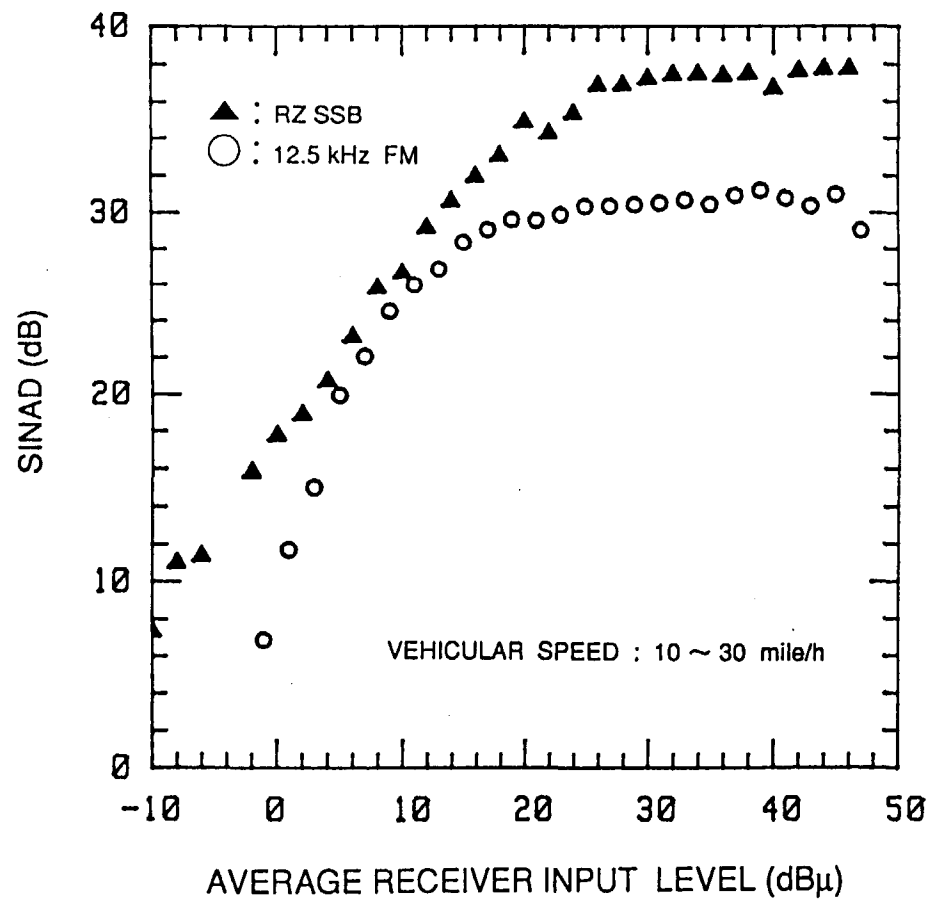


AVERAGE BERS OF 19.2 kbps VOICE-BAND MODEM WITH 128-QAM

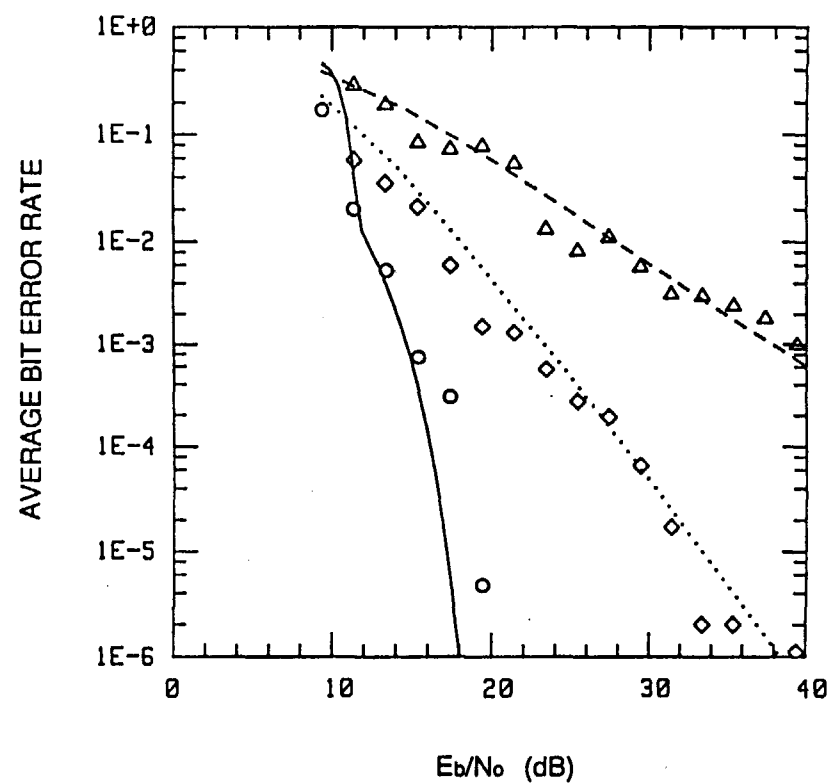


- × : THERMAL NOISE (NON-FADING)
- ◇ : 5 Hz FADING, WITH DIVERSITY
- : 10 Hz FADING, WITH DIVERSITY
- △ : 20 Hz FADING, WITH DIVERSITY
- : OPTIMAL FIT CURVE FOR INDOOR EXPERIMENTAL DATA
- : THEORETICALLY ESTIMATED CURVE FOR DIVERSITY

SINADS VS. RECEIVER INPUT LEVELS FOR RZ SSB AND 12.5 kHz FM WITH DIVERSITY RECEPTION



AVERAGE BERS OF 9.6 kbps VOICE-BAND MODEM WITH 16-QAM



- : NOT MOVING
- ◇ : 10 ~ 30 mile/h SPEED, WITH DIVERSITY
- △ : 10 ~ 30 mile/h SPEED, WITHOUT DIVERSITY
- : OPTIMAL FIT CURVE FOR INDOOR EXPERIMENTAL DATA
- : THEORETICALLY ESTIMATED CURVE FOR DIVERSITY
- : THEORETICALLY ESTIMATED CURVE FOR NON-DIVERSITY